SIR JOHN LUBBOCK has been elected President of the London Society for the Extension of University Teaching, in succession to Mr. Goschen, M.P., resigned.

MR. GILBERT R. REDGRAVE has been appointed Chief Senior Inspector of Schools and Classes under the Science and Art Department, and Mr. T. B. Shaw, Inspector of the North-Western District, has been promoted to a Senior Inspectorship.

SCIENTIFIC SERIALS.

WE have received two recently issued parts of the *Journal of the Asiatic Society of Bengal* (vol. lxiii. part ii. Nos. 1 and 3) containing, *inter alia*, an important paper by Mr. Lionel de Nicéville (the author of the admirable book on the butterflies of India, Ceylon, and Burma, now approaching completion), on new and little-known butterflies from the Indo-Malayan region, illustrated by five excellent coloured plates, representing species belonging to most of the principal families represented in the district. Among the species figured is a handsome new species of *Stichophthalma* (*S. sparta*) from Manipur, allied to the well-known Chinese *S. howqua*, of Westwood, belonging to a genus allied to the great blue Morphos of South America, and not inferior to some of them in size; a gynandomorphous specimen of the common, but very remarkable, Indian Fritillary, *Argynnis niphe*, L., the female of which mimics the abundant, highly-protected, and much-imitated *Danaus chrysippus*, L.; several species of *Laxita*, Butler, a beautiful genus allied to our Duke of Burgundy Fritillary, but much larger, and with rounded brown wings, generally suffused with crimson on the fore wings, and marked with metallic blue spots beneath; three species of *Papilio*, two of which mimic species of the widely-removed sub-family *Euplœinæ;* and many other interesting species. Several genera, as well as a large number of species, are described as new, and much fresh information is given relative to species already known. Several very useful lists and tables are also included in the paper, relative to the species of *Daphla*, allied to *D. teuta*, Doubleday and Hewitson, and those of the genera *Gerydus*, Boisduval, *Logania*, Distant, &c. When we look at the number of important books and papers that are now constantly issuing from the press on the butterflies of various parts of the British East Indies, it seems strange to remember that thirty years ago almost nothing had been published specially on the subject, except Horsfield and Moore's Catalogue of the Lepidoptera in the East India Company's Museum, and Westwood's "Cabinet of Oriental Entomology."

Memoirs (*Trudy*) *of the St. Petersburg Society of Naturalists*, vol. xxiv. part 1, Zoology and Physiology.—Notes on birds found in the Mediobor Mountains of Podolia, by I. D. Mikhalovsky. Seventy-two species are mentioned.—On the structures and reactions of the cells of the digestive tube of the pupæ of *Musca Cæsaris vomitoriæ*, by N. Kholin, with one plate.—The Natural History Museum of Great Britain, and other zoological institutions of West Europe, by A. Yaschenko.—Report on the cruise of the *Nayezdnik* in the Arctic Ocean in 1893, by N. Knipovitch. Leaving Reval, the cruiser visited the Murman coast, the Dvina and Onega bays of the White Sea, and the west coast of Novaya Zemlya, entering the Matochkin Strait and the Yugorskiy Shar. No less than eighty successful dredgings, down to depths of 190 fathoms, as well as measurements of temperature, were made. The author's remarks on the differences of colour and density of the blue Gulf Stream water, which is easily traced along the Murman coast, and the more so along the coast of Novaya Zemlya, are especially interesting. The colour and the density better delineate the south-east limits of the Gulf Stream current than the differences of temperature which are affected in both the Gulf Stream and the cold current by various local causes. In the bays of the White Sea, M. Knipovitch found in the bottom mud, which has temperatures of one or two degrees below zero, the *Yoldia arctica*, characteristic, as is known, of the Glacial period deposits and the Arctic Seas; while the same has never been found in the Arctic Ocean off the Murman coast, nor in the eastern parts of the Barents's Sea.—Report on the zoological institutions of West Europe, by Prof. K. Sainte Hilaire.—In the *Proceedings* we notice a very interesting report, by A. A. Birulia, on the part played by the phagocytes in the sexual processes with the *Galeodes*, and A. K. Trotsin's report on his zoological journey to the Transcaspian region and Russian Turkestan.

THE *Meteorologische Zeitschrift* for January contains a careful discussion of the rainfall of the Sandwich Islands, by Dr. J. Hann, based chiefly on observations supplied by the Director of the Weather Service at Honolulu. The amount of the rainfall is subject to great fluctuations. At Hilea, Kau (on the south side of Hawaii), 44·5 inches fell in 1886, and of this amount 51 per cent. fell in November. In 1889 the annual fall was only 13·9 inches, or about half as much as in November 1886. At Honolulu the average annual fall is 40 inches. The heaviest falls occur on the windward side of the largest of the islands, that is, on the north-east of Hawaii, and the smallest falls occur on the southern part of Oahu, and the south-west of Maui. The wettest period in almost all the islands is from November to March. The principal exception to this is on the leeward side of the mountains of Hawaii, where more rain falls in summer than in winter.

SOCIETIES AND ACADEMIES.

LONDON

Physical Society, March 8.—Mr. Walter Baily, Vice-President, in the chair.—Mr. Naber exhibited, and shortly described, a new form of gas voltameter. The chief advantages claimed for this instrument are that either the oxygen or the hydrogen can be collected separately, and that the level of the liquid inside and outside the burette can be made the same; thus no correction has to be applied to the volume of the gas on this account. Variations in the temperature and barometric pressure are allowed for by reading an air thermometer which is fixed alongside the burette. The inventor considers that this instrument will compare favourably in accuracy with the copper and silver voltameters now in general use. Prof. S. P. Thompson considered that now so much care had been bestowed on the design of a gas voltameter, this instrument might come into more general use than heretofore.—Dr. Johnstone Stoney, F.R.S., exhibited (1) the local heliostat, (2) an improvement in siderostats. By a local heliostat the author means one which can only be used in places the latitudes of which differ slightly from that of the place for which the instrument was specially constructed. The limits within which the instrument works with sufficient accuracy for ordinary spectroscopic work, are such that one instrument can be used in any place in the British Isles. The heliostat exhibited was a modification of one previously described by the author, which is now in very general use, and it is capable of sending a reflected ray in any direction in, or nearly in, a horizontal plane. In the new instrument the pendulum clock previously used to supply the motive power, is replaced by a balance-wheel clock; this change decreases the cost of the instrument, while it adds to its portability. A tangent screw, worked by a long rod, supplies a slow motion for adjusting the position of the reflected beam, and is of use when examining the spectra of the solar prominences, &c. The instrument is adjusted in the meridian by means of a gnomon and horizontal divided circle which form a sun-dial. This divided circle is so arranged that it is always horizontal when the polar axis is in adjustment, and can therefore be used whatever the latitude of the station at which the observations are being made. In connection with the use of a heliostat in conjunction with a spectroscope, the author recommends, when using a grating, the introduction of a large glass prism between the heliostat and the slit of the spectrometer. An impure spectrum is thus formed on the slit, and by moving the slit to the part of this spectrum corresponding to light of the wave-length under observation, the difficulties due to the overlapping of the spectra may in a great measure be overcome. After mentioning that the great difficulty in designing a siderostat which should work with "astronomical accuracy," is to get a form of sliding motion quite free from back-lash, and which will move perfectly regularly, Dr. Stoney exhibited a model of a form of mechanism for obtaining such a motion which he had devised. The principle on which the instrument depends is that, if you have a point fixed to a circle which rolls on the inside of another circle of double the diameter, this point will describe a straight line. The smaller disc does not, in the model exhibited, roll directly on the larger disc, but an idle wheel is introduced which rolls on the *outside* of both the discs. Slip is avoided by placing steel bands between the idle wheel and the discs, one end of each of the two bands being fixed to the circumference of the idle wheel, while the other ends are fixed, one to the circumference of each of the discs. Back-lash is prevented by means of a spiral spring attached to a point on the smaller disc; this point being so chosen that it moves nearly perpendicular to the direction in which the spring acts. Hence the spring is always stretched to nearly the same amount, and no extra strain is brought to bear on the driving-clock in different positions of the instrument. Prof. S. P. Thompson considered that the best method to employ when using sunlight was to incline the telescope, &c., parallel to the polar axis, under which circumstance the mirror of the heliostat need only rotate about a vertical axis.—A paper, on a simple form of harmonic analyser, was read by Mr. G. U. Yule. At a former meeting of the Society, Prof. Henrici showed a form of analyser in which the paper on which the curve is traced was given a to-and-fro movement, a planimeter being used as an integrator. The author being struck with the advantages of the use of a planimeter, both as regards cheapness and simplicity, has devised another form of analyser in which a planimeter is used. The principle on which this instrument works is as follows:—Suppose we have a straight line (X X) which can move parallel to the base line of the given curve, so that every point in this line describes a perpendicular to the base; further, suppose that a disc, the circumference of which is some aliquot part of the base of the curve, say $2\,l/n$ where $2\,l$ is the base length, is capable of rolling on the line (X X) without slip. If the centre of the disc is brought over the initial point of the curve, and any point (D) at a distance r from the centre on a horizontal diameter is marked, then if the centre of the disc is made to describe the curve which is to be analysed, the area of the curve described by the point D is given by the equation

$$\mathrm{R}_1 = \alpha + \cos n\pi \frac{rn\pi}{l}\int_{-l} y \sin n\theta \, dx,$$

where α is the area of the curve to be analysed. Similarly, if the point D is taken originally on a vertical diameter, the area of the curve traced out is

$$\mathrm{R}_2 = \alpha + \cos n\pi \frac{rn\pi}{l}\int_{-l}^{+l} y \cos n\theta \, dx.$$

In any practical case it is convenient to take r some multiple of $1/\pi$ units of length, say 10, then the above equations become

$$\mathrm{R}_1 = \alpha + \cos n\,\pi.\ 10\,n.\ \ \mathrm{B}_n$$

and

$$\mathrm{R}_2 = \alpha + \cos n\,\pi.\ 10n.\ \ \mathrm{A}_n$$

where B_n and A_n are the coefficients of $\sin n\theta$ and $\cos n\theta$ in the Fourier series expressing the equation to the curve. The areas of the curves traced out by the point D (R_1 and R_2) are obtained by allowing the tracing-point on an Amsler planimeter to rest in a small conical hole at D. The line X X is the edge of a rolling parallel ruler which has a rack cut along it. A series of toothed wheels give the coefficients of the different terms in the series. In the instrument exhibited there were wheels to give the first four terms, but the author said it was possible to work with wheels which gave the sixth term. The above analyser was the outcome of a simple step-by-step integrator which the author had devised. In this case the base line of the curve having been divided into a number of equal parts, then, by means of a scale of sines attached to the instrument, the tracing-point of a planimeter is set at a point whose abscissa is $\sin n\theta$, while it is moved parallel to the axis of y through a distance δy corresponding to one of the elements into which the base was divided. Prof. Henrici said he had at one time considered the question of constructing an analyser which should employ a planimeter as the integrator, and he was particularly pleased with the instruments exhibited. Since the area required was the difference between the area of the original curve, which is traced out by the centre of the disc (K), and the curve traced out by the point D, and since this area is really the area swept out by the straight line K D, if we attach an integrating wheel to the disc, with its axle parallel to K D, the required area can be directly obtained from the reading on this wheel. In addition, if a second integrating wheel were fixed to the disc, with its axle perpendicular to K D, the coefficients of $\cos n\theta$ and $\sin n\theta$ could both be obtained by going round the curve once. The instrument devised by Mr. Yule was practically the inverse of one he (Prof. Henrici) had invented. Dr. Burton pointed out some incorrect signs in the proof given; these, however, do not affect the final expressions obtained. Mr. Inwards suggested that errors due to back-lash might be avoided by using either a double wheel or a double rack, so that by means of a spring each side of the teeth which were engaged might be in contact at the same time.—Prof. Minchin gave a short account of a paper by Mr. H. N. Allen, entitled "The Energy Movements in the Medium Separating Electrified or Gravitating Particles." The object of the paper is to trace out the equipotential surfaces and lines of flow for two electrified points or gravitating particles, and then to consider the paths along which the "energy cells" move when the charged points or gravitating particles either move towards or away from one another. By energy cell the author understands the small volume of the dielectric bounded by the walls of a tube of force, and by two neighbouring equipotential surfaces, which can be looked upon as containing a certain definite amount of energy. The author gives two figures showing the paths of the energy cells: (1) when the charged particles come together and meet; (2) when they separate and move off to infinity in opposite directions. Using Maxwell's expression for the pressure along the lines of force, and the equal tension at right angles required by his theory to account for the attraction exerted by the sun on the earth, the author has calculated the energy density in the medium at the surface of the sun. The value obtained is 16·horse power-hours per c.c. Hence he concludes that, at a distance from all gravitating bodies, a c.c. of ether contains at least this amount of energy. Prof. Minchin showed how, by the use of polar coordinates the expressions given by the author could be simplified. He also gave a graphical method of obtaining the equipotential surfaces for any configuration having given those for any other configuration. He pointed out that by a similar line of reasoning to that used by the author, the energy per c.c. of the medium at the surface of Arcturus must be 8100 times as great as at the surface of the sun, so that the minor limit given above by the author must be multiplied by 8100 at least.

Entomological Society, March 6.—Prof. Raphael Meldola, F.R.S., President, in the chair.—Mr. B. G. Nevinson exhibited a long series of *Heliothis peltigera*. He stated that the specimens were bred from larvæ found on the Dorsetshire coast during July 1894, feeding on the flowers of *Ononis arvensis*, which were extremely luxuriant. A few also were taken on *Hyoscyamus niger*. He added, that all the larvæ went down by the end of July. The first emergence took place on August 20, and they continued coming out at the rate of about five a day, through the rest of that month and September; only five emerged in October, and the last one appeared on November 11. Mr. G. T. Bethune-Baker, Mr. Eustace Bankes, Mr. B. A. Bower, the Rev. Seymour St. John, and Mr. H. Goss made remarks on the habits and distribution of the species in England.—Mr. Bower exhibited a variable series of *Scoparia basistrigalis*, Knaggs, showing light, intermediate and dark forms, taken at Bexley, Kent, from June 12 to July 7, 1891–94. He said the species appeared to be poorly represented in collections, and when present was almost invariably misnamed. Mr. Bankes commented on the rarity of the species, and said the specimens exhibited formed the most interesting collection of it and its varieties which he had ever seen.—Lord Walsingham, F.R.S., exhibited larvæ of *Pronuba yuccasella*, which he received more than four years ago from Colorado, and which were still living. One specimen of the moth had emerged two years ago.—Mr. Goss exhibited, for Mr. G. C. Bignell, a pupa of a Tortrix, with the larval legs, and also a specimen of a Sawfly, *Emphytus cinctus*, L., with eight legs. Mr. G. H. Verrall and Mr. McLachlan made some remarks on the latter species, and as to the insertion of the fourth pair of legs.—Prof. Meldola exhibited a wooden bowl from West Africa, from which, after arrival in this country, a number of beetles (*Dermestes vulpinus*) had emerged. Specimens of the latter were also exhibited. It was not clear to the exhibitor whether the larvæ had fed upon the wood, or had simply excavated the cavities which were apparent in the interior of the bowl for the purpose of pupating. Mr. McLachlan, Mr. J. J. Walker, Herr Jacoby, and Lord Walsingham made some remarks on the habits of Dermestes.—Mr. Champion read a paper entitled "On the Heteromerous Coleoptera collected in Australia and Tasmania by Mr. J. J. Walker, R.N., during the voyage of H.M.S. *Penguin*, with descriptions of new genera and species.

Part ii." Mr. Walker and Mr. Gahan made some observations on the distribution of certain of the species described.—Mr. Roland Trimen, F.R.S., contributed a paper entitled "On some new species of butterflies from tropical and extra-tropical South Africa."—Mr. G. A. James Rothney contributed a paper entitled "Notes on Indian Ants," and sent for exhibition a number of specimens in illustration of the paper, together with nests of certain species.

Geological Society, February 20.—Dr. Henry Woodward, F.R.S., President, in the chair.—The President announced to the Fellows the grievous loss which the Society had suffered in the decease of its Foreign Secretary, Mr. J. W. Hulke, F.R.S., President of the Royal College of Surgeons. He dwelt on the great value of Mr. Hulke's work in vertebrate palæontology, on his long services as a member of Council and an officer of the Society, and on his amiable personal qualities, which had endeared him to a wide circle of friends. He read the following resolution which the Council had that afternoon unanimously voted, and communicated to Mrs. Hulke with the expression of their heartfelt sympathy: "That this Council most deeply deplore the sad loss that the Society and all those interested in palæontology have sustained by the untimely decease of our Foreign Secretary, Mr. J. W. Hulke, F.R.S., whose investigations in various branches of science have led to such valuable results."—Contributions to the palæontology and physical geology of the West Indies, by Dr. J. W. Gregory. The earlier part of the paper was largely concerned with the corals of the raised reefs of Barbados, and, on account of the confusion in the synonymy of the West Indian corals, the synonymy of the species was given in some detail. A list of the mollusca of the low-level reefs followed. In discussing the age of the Barbados rocks, the author stated that the following was the sequence (in descending order):—

Raised coral reefs	Low level: Pleistocene.	
	High level: Pliocene.	
Oceanic series ...	*Archæopneustes-abruptus*-limestone. Thalassic marls.	Miocene (and possibly partly Pliocene) and partly Oligocene.
Scotland beds ...	Oligocene (probably Lower).	

—The Whitehaven sandstone series, by J. D. Kendall. The Whitehaven sandstone, with its associated shales, is a purple-grey deposit sometimes having a thickness of 500 or 600 feet. The author gave details of a large number of sections of the series, which also contains thin coal-seams and occasionally *Spirorbis*-limestone.—Notes on the genus *Murchisonia* and its allies, with a revision of the British carboniferous species, and descriptions of some new forms, by Miss J. Donald.

Zoological Society, March 5.—Sir W. H. Flower, K.C.B., F.R.S., President, in the chair.—The Secretary read a report on the additions that had been made to the Society's menagerie during the month of February, and called special attention to a fine female giraffe recently arrived from South Africa. This was believed to be the first example of the large, dark-blotched race ever seen alive in Europe, the giraffes previously exhibited having belonged to the smaller and paler form found in Northern Tropical Africa. The Society has also purchased a pair of Sable Antelopes (*Hippotragus niger*) and a pair of Brindled Gnus (*Connochætes taurina*), all in excellent condition.—Dr. St. George Mivart, F.R.S., read a paper on some distinctive structural characters in the hyoid bone in certain parrots.—Mr. A D. Michael read a paper on a new Freshwater Mite found in Cornwall, and belonging to the genus *Thyas*, of which only two species were previously known. It is proposed to call it *Thyas petrophilus*.—Mr. G. A. Boulenger, F.R.S., read a paper "on the nursing-habits of two South-American Frogs," and exhibited a specimen of *Hyla goeldii* with eggs on the back. He also made remarks on a male specimen of *Phyllobates trinitatis* from Venezuela, carrying its tadpoles on its back, in the same way as had previously been observed in frogs of the genus *Dendrobates* from Surinam and Brazil.

Royal Meteorological Society, February 20.—Mr. R. Inwards, President, in the chair.—Mr. W. Marriott gave an account of the thunderstorm and squall which burst over London so suddenly on the morning of January 23. It appears that this storm passed across England in a south-south-easterly direction at the rate of about forty-seven miles an hour, being over Northumberland at 4 a.m., and reaching the English Channel by 11 a.m. Thunder was first heard in the vicinity of Leeds, and accompanied the storm in its progress across the country. One of the most remarkable features of the storm was the sudden increase in the force of the wind, for in London it rose almost at one bound from nearly a calm to a velocity of thirty-six miles an hour. This sudden increase of wind caused considerable damage, and at Bramley, near Guildford, twenty-eight trees were blown down along a track 1860 yards in length.—Mr. E. Mawley presented his report on the phenological observations for 1894. Between the third week in March and the third week in May plants generally came into blossom in advance of their usual time, and towards the end of April the dates of first flowering differed but little from those recorded at the same period in the very forward spring of 1893. The cuckoo made its appearance even earlier than in the previous year. The year 1894 was a very productive one, and both the hay and corn crops proved unusually heavy, but much of the latter was harvested under very trying conditions as regards weather. The frosts of May 21 and 22 entirely destroyed the previous prospect of a glorious fruit season. Indeed, the only really good crop was that of pears, which were singularly abundant throughout nearly the whole of England.—Mr. A. B. MacDowall read a paper on some gradual weather changes in certain months at Greenwich and Geneva.

DUBLIN.

Royal Dublin Society, November 21, 1894.—Prof. W. J. Sollas, F.R.S., in the chair.—The following papers were read: On the occurrence of seiches in Lake Derravaragh, co. Westmeath, by Staff-Commander J. R. H. MacFarlane, R.N. This paper (communicated by Prof. D. J. Cunningham, F.R.S.) is interesting as being the first record of observations, from the United Kingdom, of these phenomenal changes of the level of the water in lakes. These singular rhythmic movements, somewhat resembling tidal ebb and flow, were found occurring in the Swiss lakes towards the close of the last, and beginning of the present, century, and many skilful observers devoted considerable time in the endeavour to elucidate the cause or causes; but, as yet, no distinct explanation has been given, although it would appear to have been generally noticed that they are accompanied by a low barometer. It also appears that the characteristics of the land, surrounding the observation spot, influence the time occupied by a complete rise and fall of the water, which has been termed the *duration of the seiche*; and, further, that it is probable such durations are constant for each observation spot, but the *amplitude*, or amount of rise above, and fall below the level, will depend on the amount of influence exercised in causing the seiche; this influence being at present unknown. The observations made at Lake Derravaragh were necessarily confined to one spot, no other observers being available for synchronous observations at different stations. The maximum amplitude recorded was 5·8 inches, and the duration of seiche, fairly constant, about 39 minutes.—A paper was communicated by Sir Charles Cameron, on the effect of poisons and antiseptics on germination, by Mr. F. H. Perry Coste.—The Rev. R. Bodkin described an "automatic image-finder," the object of which is (1) to show where the image of any object placed before any lens must be formed; (2) to prove that the image is found there; (3) to help to explain the construction of the various optical instruments in use such as the microscope, telescope, camera, and projection lamp.

December 19.—Sir Howard Grubb, F.R.S., Vice-President, in the chair.—The following papers were read: Mr. John R. Wigham described and demonstrated a method of increasing the power of continuous lighthouse lights.—Prof. W. J. Sollas, F.R.S., gave a description of a new fossil, resembling annelid tubes, from the Cambrian of Puck's Rocks, Howth, near Dublin. Upon this fossil the author has bestowed the name *Pucksia MacHenryi*.

PARIS.

Academy of Sciences, March 11.—M. Marey in the chair.—On argon, by M. Berthelot. The author announces the combination of the new element with benzene vapour under the influence of the electric discharge, and promises details to follow.—Remarks on the curves defined by a differential equation of the first order, by M. Émile Picard.—On the total eclipse of the moon of March 11, by M. J. Janssen. The importance of observations of lunar eclipses by photographic photometry in connection with the constitution of the higher regions of our atmosphere is emphasised.—On the losses of nitrogen carried off by infiltrated water, by M. Schlœsing. The loss of nitrogen by soils in the basin of the Seine through the elimination of nitric acid in drainage waters is discussed. In conclusion the author believes such losses not to be very important; they are roughly proportional to the richness of the soil in organic matter, and do not much impoverish already poor soils.—Analysis of oyster-shells, by MM. A. Chatin and A. Muntz.—Demonstration of a theorem of whole numbers, by M. de Jonquières. If $a_1, a_2, a_3, \ldots, a_n$ are n different whole numbers, the product $\Pi\,(a)$ of all these numbers, multiplied by the product $\Pi\,(a_i - a_j)$ of their differences by twos, is a multiple λ of the product of n first numbers 1, 2, 3, . . . , u, multiplied by the product of their differences by twos, that is to say, is equal to $\lambda\,(1^n . 2^{n-1} . 3^{n-2} . \ldots . \overline{n-2}^3 . \overline{n-1}^2 . n)$.—Observations of Wolf's planet BP (23 February, 1895) made with the great equatorial of Bordeaux Observatory, by MM. G. Rayet and L. Picart, noted by M. G. Rayet.—Volumes of salts in their aqueous solutions, by M. Lecoq de Boisbaudran.—On M. Darboux' method for the integration of equations to the derived partials of the second order, by M. E. Goursat.—On certain algebraical groups, by M. E. Cartan.—On "fonctions entières," by M. H. Desaint. The "fonctions entières" of the type 0, 1 or 2, of which the exponential multiplier of the infinite product of primary factors of M. Weierstrass is of the form $Ae^{\alpha x^2+\beta x+\gamma}$, where A is a constant, α and β real and α positive, possess the property that, if their zeros are real, the zeros of their derivatives are also zeal.—On the direct measurement of the mean spherical luminous intensity of sources of light, by M. A. Blondel. A description of the instrument termed a *lumen-mètre* and its use.—On the analysis of silicon, by M. Vigouroux.—Action of formaldehyde on ammoniacal salts, by MM. A. Brochet and R. Cambier. The first action of ammonium chloride on formaldehyde may be admitted to be the production of $(CH_2 : NH.HCl)_3$. This reacts on heating as follows: $2(CH_2 : NH.HCl)_3 + 3CH_2O + 3H_2O = 6(CH_3.NH_2.HCl) + 3CO_2$, giving a theoretical yield.—On acid chlorides and aldehyde chlorides, by M. Paul Rivals. The thermal data are given for monochloracetic chloride and trichloracetic chloride, and are shown to vary in the same way as with the corresponding acids.—Optical resolution of α-oxybutyric acid, by MM. Ph. A. Guye and Ch. Jordan. The synthetical α oxybutyric acid is a racemic form. The authors have successfully separated the lævorotatory form from the dextrotatory form by means of their brucine salts.—On daturic acid, by M. E. Gérard. The acid is shown to have a real existence, and forms definite metallic salts. It does not consist of a mixture of stearic and palmitic acids.—Glycogen in the blood in normal and in diabetic animals, by M. M. Kaufmann. Glycogenic matter is a constituent of normal blood. The blood of animals rendered diabetic by extirpation of the pancreas contains much more glycogen than that of healthy animals.—On the signification of the disengagement of carbonic acid by the isolated muscles of the body, compared to that of the absorption of oxygen, by M. J. Tissot. The total quantity of carbonic acid disengaged by a muscle placed in the air has no relation with the phenomena of physiological activity, of which the isolated muscle is yet the seat. The absorption of oxygen is alone related to the manifestation of physiological activity, the absorption being at the maximum when the muscular activity is greatest, and at the minimum when it is diminished or on the point of disappearing.—On the structure and affinities of *Microsporon*, by M. Paul Vuillemin. The author includes *Microsporon vulgare* among the Phycomycetes, and not among the Saccharomycetes. It is not a necessary parasite, is found on healthy skin, but is adapted for parasitism, and is most abundantly found in the epidermis of new-forming spots of simple pityriasis.—On the embryonic development of the Dromiacean genus *Dicranodromia*, by M. Eug. Caustier.—On a new combination of forms on quartz crystals, by M. Fred. Wallerant.—On an approximate estimate of the frequency of earthquakes on the surface of the globe, by M. F. de Montessus de Ballore.

BERLIN.

Physiological Society, February 1.—Prof. du Bois Reymond, President, in the chair.—After a discussion on Dr. Cohnstein's communication on "intravenous infusion of sodium chloride," Prof. G. Fritsch discussed the simple principles on which he had for many years obtained stereoscopic photographs on an enlarged scale. He exhibited a series of these photographs, among which those of the inner ear excited particular interest.

February 15.—Prof. du Bois Reymond, President, in the chair.—Prof. Zuntz gave an account of experiments, made in conjunction with Staff-Surgeon Dr. Schumburg, on the effect of load on the metabolism and body-functions of soldiers on the march. Two students, feeding uniformly on a somewhat complicated but accurately analysed diet, made on alternate days marches up to 45 kilometres with a load increasing to 31 kilograms. Taking first the nitrogenous metabolism, it was found that the excretion of nitrogen through the urine and sweat was but slightly increased by even the most severe exertion. The slight loss of proteid thus noticed was made good in the subsequent period of rest. At the end of each experiment the consumption of oxygen was found to be greater than at the beginning. When the marches were made on three consecutive days with an increasing load, it was found that the consumption of oxygen was increased even at the beginning of the third day's march, and was still further increased at its end. The body-temperature rose to 38°·5 C., and in some cases to 40° C. The heat production was three times as great as during rest, and the regulation of temperature to compensate for this was almost entirely brought about by the evaporation of sweat. The concentration of the blood was found to be but very slightly increased by exhausting marches; the red blood-corpuscles were scarcely more numerous than normally, whereas the white were markedly increased in number. The movements of the heart at the end of the experiments showed a lengthening of the systole and distension of the right ventricle, whose dull area on percussion, as also that of the liver, was extended during severe exertion. The respiratory activity was at first, and with light loads, improved, but later on difficulties of breathing made their appearance. The psychic condition, as measured by the reaction-time to simple stimuli, was not depressed by heavy marches; but when fatigued the patients reacted more slowly to complicated stimuli. Muscles not used in marching, were as readily excitable at the end of the most severe march as during complete rest. A high external temperature was found to exert the same influence with a light load, as the heaviest load did at more moderate temperatures, and some details of the experiments were found to depend on individual peculiarities.

Meteorological Society, February 5.—Prof. Hellmann, President, in the chair.—Prof. von Bezold spoke on the unstable equilibrium of the atmosphere which precedes a thunderstorm. The fact that in the interior most thunderstorms occur in the afternoon and during the summer, whereas near the coast they are most frequent at night and in the winter, shows that there must be different causes for the instability. As a matter of fact the speaker showed that not only over-heating of the lower layers of air, but also excessive cooling of the upper layers, must lead to unstable equilibrium and a correspondingly powerful upward current of air. A similarly unstable state is brought about by the sudden solidification of strongly cooled water-drops, or the condensation of air highly supersaturated with moisture. The conditions for the realising of the above states are different in the interior and at the coast or over the sea, and the mode of formation of a thunderstorm is also correspondingly different. He considered it very desirable that further observations of thunderstorms at sea should be collected.—Mr. Archenhold exhibited water-colour drawings, made by Captain Henning in 1884, of the unusual twilights then occurring, he being at the time ignorant of the abnormality as observed by others. One of the most remarkable features in the drawings were the sharp and straight lines of demarcation in the colours of the sky. The speaker further exhibited a photograph of a halo he had observed by moonlight.

Physical Society, February 8.—Prof. Schwalbe, President, in the chair.—Dr. Neuhaus exhibited a series of colour photographs taken by Lippmann's method with prolonged exposure. Spectra show, if the exposure is sufficiently long, a greenish band in the infra-red as well as in the ultra violet, in addition to the ordinary colours. The coloured band was very markedly displaced by both over- and under-exposure. The photographs of objects with mixed colours, such as fruits, flowers, butterflies, &c., were also good; but their production was extremely difficult, and only one plate in twenty-five was, on an average, successful. It was found more easy to photograph naturally mixed than artificially mixed colours. When describing his methods, it was pointed out that some substance such as eosin or cyanin must be added to the films to make them more sensitive to red rays, and less sensitive to blue. When dealing with the theory of colour photography, which was expounded by Dr. Zenker as early as 1868, the speaker referred to a number of difficulties which had not yet been solved. Thus, in the first place, nobody has as yet demonstrated the existence of the superimposed silver films in the gelatine, although they should be visible under the microscopic powers now available. In the next place, the presence in the gelatine film of granules whose diameter is equal to several half-wave-lengths is not reconcilable with the usual theory of colour photography; so that, on the whole, a comprehensive theory of the phenomena has still to be established.—Mr. Archenhold gave some additional details as to the mechanical parts of the great telescope he had described in the previous meeting of the Society.

February 22.—Prof. von Bezold, President, in the chair.—Prof. Lummer spoke on the necessary corrections of dioptric systems, and developed theoretically the possibility of the law of points holding good for certain relations between focal length and aperture. Prof. Raoul Pictet spoke on the "critical point," and explained his own views, according to which substances must still be in the fluid state at the critical point. This follows from the fact that the amount of heat which must be put into the substance, as reckoned from absolute zero, is less than the latent heat of the liquid, and the fact that solid bodies do not separate out from solution at the critical temperature. They must be still in solution in the fluid, since they separate out in the crystalline form by a further rise of temperature, and go into solution again as the temperature falls to the critical point. This last fact was demonstrated by the speaker on a solution of iodide of potassium.

AMSTERDAM.

Royal Academy of Sciences, January 26.—Prof. van de Sande Bakhuyzen in the chair.—Mr. Franchimont communicated a paper on a new class of urea-derivatives, viz. the urea-alcohols or ureols, one of which, ureo æthanol, has been prepared by the author and Mr. Van Breukeleveen. This body, obtained from amino aethanol through Wöhler's synthesis of urea, forms colourless crystals, which fuse at 95°, and dissolve readily in water, methyl-alcohol and ethyl-alcohol, but very sparingly or not at all in most organic solvents. It appears to possess properties both of urea and of an alcohol. With nitric acid it forms a compound, which is decomposed by so-called real nitric acid at the ordinary temperature, with the formation of carbonic acid and nitrous oxide. With benzoyl chloride it yields a benzoate, which fuses at 129°, and is decomposed by nitric acid in the manner described above. With acetic anhydride and sodium acetate, a diacetyl derivative is obtained, which fuses at 102°.—Mr. Hoogewerff directed attention to an apparatus, devised last summer by Mr. J. Boot. The object of the apparatus is to easily and quickly graduate retorts, pipettes, and burettes, especially such as are intended for techno-chemical researches. The firm of Kobb at Stützerbach in Thüringen has been commissioned to make the apparatus. Mr. Van der Waals showed that the condition for the equilibrium between coexistent phases, viz. the equality of the thermodynamic potential, may be deduced from the kinetic theory by assuming that the two phases interchange an equal number of particles, and may be regarded as a particular instance of the more general law by which the kinetic theory expresses the density in different parts of a space, wherein the moving molecules are subjected to the action of forces.—Prof. Kamerlingh Onnes communicated the results of investigations in the Leiden laboratory by: (1) Dr. L. H. Siertsema on the magnetic rotational dispersion of oxygen and nitrogen at a pressure of 100 atm., giving the following relation between the rotation w and the wave-length λ: oxygen $w = \mathrm{C}.\,\frac{868{\cdot}03}{\lambda}\left(1 + \frac{0{\cdot}07202}{\lambda^2}\right)$, nitrogen $w = \mathrm{C}.\,\frac{560{\cdot}41}{\lambda}\left(1 + \frac{0{\cdot}32424}{\lambda^2}\right)$ and proving again the superiority of Maskart's formula (see p. 470). (2) Dr. P. Zeeman on the Kerr effect in polar reflection on iron and cobalt at normal incidence, tending to the conclusion that none of the proposed theories completely explains Sissingh's phase-difference. (3) Dr. P. Zeeman on the optic constants of magnetite, determined with regard to the relation between Sissingh's phase in the Kerr phenomenon and the maximum of magnetisation. (4) Mr. A. Lebret on the variation of the Hall effect in bismuth with temperature, it being found to be nearly linear between – 38° and 239°.

BOOKS, PAMPHLETS, and SERIALS RECEIVED

BOOKS.—The Pygmies: A. de Quatrefages, translated by F. Starr (Macmillan).—The German Universities, their Character and Historical Development: Prof. F. Paulsen, translated by Prof. E. D. Perry (Macmillan).—A Treatise on Bessel Functions and their Applications to Physics: Profs. Gray and Mathews (Macmillan).—Meteorology, Weather, and Methods of Forecasting, &c.: T. Russell (Macmillan).—Diary of a Journey through Mongolia and Tibet in 1891 and 1892: W. W. Rockhill (Washington).—Bourne's Handy Assurance Directory, 1895 (Schooling).—An Elementary Text-Book of Hydrostatics; W. Briggs and G. H. Bryan (Clive).—The Telegraphist's Guide to the New Examinations in Technical Telegraphy: J. Bell (*Electricity* Office).—The Source and Mode of Solar Energy throughout the Universe: Dr. I. W. Heysinger (Lippincott).—Handbook of Jamaica, 1895 (Stanford).—Im Reiche des Lichtes: H. Gruson (Braunschweig, Westermann).—Honest Money: A. T. Fonda (Macmillan).—Collected Papers on some Controverted Questions of Geology: Dr. J. Prestwich (Macmillan).

PAMPHLETS.—N.S.W. Government Railways and Tramways—Annual Report of the Railway Commissioners for the Year ending June 30, 1894; Do., Supplement to the Railway Commissioners' Annual Report.—Die Reisen des *Jason* und der *Hertha* in das Antarktische Meer 1893–94: Dr. J. Petersen (Hamburg, Friederichsen).

SERIALS.—Science Progress, March (Scientific Press, Ltd.).—Medical Magazine, March (Strand).—Proceedings of the Physical Society of London, Vol. xiii. Part 4 (Taylor and Francis).—Engineering Magazine, March (Tucker).—Memoirs and Proceedings of the Manchester Literary and Philosophical Society, 4th series, Vol. 9, No. 2 (Manchester).—Essex Institute, Historical Collections. Vol. 30 (Salem, Mass.).—Journal of the Franklin Institute, March (Philadelphia).—Internationales Archiv für Ethnographie, Band vii. Heft 4 (Leiden, Brill).—Himmel und Erde, March (Berlin).—Rendiconto delle Sessioni della R. Accademia delle Scienze dell' Istituto di Bologna, 1892-93, 1893-94 (Bologna).

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